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Level of readiness of chronic pain patients to practise active self-care

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Abstract

Background: Given the limited alleviation of chronic pain with pharmacological treatments, various nonpharmacological and self-care approaches are often proposed that require patients' motivation.
Objective: To evaluate the level of readiness (LOR) to practise different types of active self-care among chronic pain patients.
Method: A quantitative cross-sectional survey was conducted among all chronic pain patients seeking care at the Pain Center of an academic hospital from June 2013 to March 2015. Sociodemographic data, pain characteristics, treatments and the LOR to practise active self-care were investigated.
Results: Among the 1524 eligible patients, 639 (41.9%) were included. The median pain duration was 8.5 years (interquartile range = 7.5). Two-thirds (63.7%) of the patients reported high pain-related disability, and 64.6% had used opioids during the previous six months. Most patients had a high (44.1%) or moderate (24.6%) LOR to practise active self-care. Multivariable multinomial regression analysis showed that independent factors associated with a high LOR were a higher level of education (relative risk ratio (RRR) = 3.42, 95% confidence interval (CI): 1.90–6.13, $p < 0.001$), unemployed status due to medical condition (RRR = 2.92, 95% CI: 1.30–6.56, $p = 0.009$), the use of dietary supplements 'against pain' (RRR = 2.77, 95% CI: 1.52–5.04, $p = 0.001$) and neuropathic pain characteristics (RRR = 1.80, 95% CI: 1.40–3.12, $p = 0.036$). Older age was a factor predicting a lower LOR (RRR = 0.97, 95% CI: 0.94–0.99, $p = 0.039$). Long-term chronic pain, severe pain-related disability and the presence of a mood disorder were not associated with a lower LOR.
Conclusion: Most chronic pain patients, including those severely affected, indicated their readiness to practise active self-care methods.
Significance: Most chronic pain patients, even those severely affected, appeared to be ready to practise active self-care therapies and we believe that further studies are needed to investigate their impact on pain and quality of life.

1. Introduction

Self-care strategies for pain management have been highlighted during the past decade. The prevalence of chronic pain is high (Breivik et al., 2006; Bouhassira et al., 2008; Hauser et al., 2014), and the alleviation of chronic pain via pharmacological or interventional treatments is limited (MacFarlane et al., 1996; Elliott et al., 2002; Kurita et al., 2012; Delgado et al., 2014).

Additionally, concerns about adverse events related to drug treatment (Turk et al., 2011; Edlund et al., 2014; Ekholm et al., 2014; Sutherland, 2014) are increasing. Thus, nonpharmacological options are suggested, including self-care (Blyth et al., 2005; Chou et al., 2007; Rosenquist Richard, 2010; Crawford et al., 2014b). Self-care is defined as therapies self-administered by patients 'to manage symptoms or consequences inherent in living with a chronic condition' (Barlow et al., 2002). This approach could 'empower patients to take control of their condition with the aim to improve quality-of-life outcome' (Boyers et al., 2013) and has the potential to provide more efficient and comprehensive chronic pain management (Crawford et al., 2014b).

In addition to being relatively safe (Crawford et al., 2014b), active self-care 'was associated with decreased pain-related disability, distress, reliance on medication, use of formal health care' and 'better general health' (Blyth et al., 2005). Moreover, a recent meta-analytic review showed a small but robust effect of guided self-help on pain severity and disability in chronic pain patients (Liegl et al., 2016). For example, physical activity adapted to a patient's condition could decrease the prevalence of chronic low back pain (Heneweer et al., 2009), pain intensity and associated disability. It could also improve quality of life and physical capacity (Baena-Beato et al., 2013), particularly in osteoarthritis (Uthman et al., 2013), neuropathic pain (Dobson et al., 2014), chronic low back pain (Hayden et al., 2005) and fibromyalgia (Busch et al., 2007). Other methods include physically oriented therapies (e.g. acupressure, self-administered therapeutic medical massage), movement therapies (e.g. yoga, tai chi, qi gong), mind–body therapies (e.g. self-hypnosis, autogenic training, meditation/mindfulness, relaxation training, breathing exercises, imagery-guided therapy) and sensory art therapies (e.g. art therapy, dance therapy, music therapy) (Crawford et al., 2014a; Delgado et al., 2014).

While patients' preferences should be taken into consideration (Wong et al., 2017), it is unclear how motivated chronic pain patients are to implement different types of active self-care. Motivation has been described as an essential factor for self-management (Jensen et al., 2003, 2004; Habib et al., 2005), because it has been recognized to impact adherence and engagement in treatment (Jensen et al., 2003; Habib et al., 2005; Dorflinger et al., 2013), as well as patient success and satisfaction for self-care in chronic pain treatment (Shutty et al., 1990; Dorflinger et al., 2013). Engagement in self-management is also influenced by the patient–provider communication process, as provider can influence motivation enhancement (Frantsve and Kerns, 2007; Dorflinger et al., 2013).

The motivation for treatment is also associated with lower pain ratings (Shutty et al., 1990) and increased ratings of physical ability (Shutty et al., 1990). Motivation consists of multiple aspects, especially beliefs concerning the pain itself and the treatment (Marcus et al., 1992; Keller et al., 2001; Jensen et al., 2003; Rau et al., 2007). The level of motivation to change has been studied in the literature and has led to the transtheoretical model (Prochaska et al., 1992; Rollnick et al., 1992; Rau et al., 2007; Korcha et al., 2012). The level of readiness (LOR) is considered to correspond to a linearization of the different stages of the transtheoretical model [45] and 'is hypothesized to predict engagement in self-management behaviors' (Jensen et al., 2003), and in chronic pain treatment (Keller et al., 2001; Habib et al., 2005). It is used to evaluate patients' motivation in chronic pain treatment (Keller et al., 2001) or to adopt different health-related behaviours (Rau et al., 2007; Korcha et al., 2012), e.g. physical activity (Marcus et al., 1992; Falk and Anderson, 2013; Ardern et al., 2014).

The main objective of this study was to evaluate the LOR to practise active self-care methods when suggested by a physician and the associated factors among the chronic pain patients of a tertiary Pain Center. The secondary objectives were to evaluate the LOR for each active self-care method and to describe which methods the chronic pain patients had already tried.

2. Methods

2.1 Design of the study

A quantitative cross-sectional postal survey was conducted among the patients of an academic medical centre using a structured questionnaire after obtaining approval from the ethics committee of the Canton of Vaud (Ref. 185/15).

2.2 Settings and sample calculation

The study was conducted in Lausanne University Hospital, Switzerland. All patients above 18 years old seeking care at the Pain Center at least once between June 2013 and March 2015 were eligible to receive the questionnaire. Patients were included if they suffered from chronic pain lasting at least six months according to the International Association

for the Study of Pain (IASP) (IASP, 1986) and if they were able to read French fluently. A lexicon (see Appendix S1) of the treatments mentioned in the questionnaire was also sent to the patients and a phone number was provided to the patients in case any questions needed clarifications during the filling of the questionnaire. A reminder was sent two weeks later to all included patients.

2.3 Questionnaire data

The questionnaire was developed by a team of pain specialists, epidemiologists and family physicians according to other published questionnaires (Zigmond and Snaith, 1983; Von Korff et al., 1992; Vollenweider et al., 2006; Bouhassira et al., 2008). It was divided into five parts: sociodemographic data, assessment of pain characteristics and associated disability, mood disorder symptoms, patient's treatments and LOR to practise active self-care. Our questionnaire was mostly based on already published instruments: Chronic Pain Grade (Von Korff et al., 1992) and Hospital Anxiety and Depression Scale (Zigmond and Snaith, 1983; Bjelland et al., 2002). Understandability and interpretability of the questions were tested via cognitive testing (Beatty and Willis, 2007). The aim was to uncover how respondents interpreted the meaning of the questions, and whether or not these matched those of the investigators. Cognitive interviews have been conducted with ten chronic pain volunteer patients and with ten healthy volunteers, with different sociodemographic backgrounds. Questions have been rephrased when there was misconception to reduce response error.

2.4 Pain characteristics

Pain characteristics were assessed through pain frequency and localization with a body diagram as used in the brief pain inventory (Cleeland and Ryan, 1994). The presence of neuropathic characteristics of pain was assessed with the *DN4 7-items questionnaire* (Bouhassira et al., 2005, 2008), validated in French and largely used in clinical and research settings (Bouhassira et al., 2008, 2013; Attal et al., 2011). The cut-off value used was 3 or more positive answers, with a sensitivity and a specificity of 78% and 81.2%, respectively, to confirm the presence of neuropathic pain (Bouhassira et al., 2005, 2008, 2013).

2.5 Chronic Pain Grade questionnaire

The pain status was assessed with the C*hronic Pain Grade questionnaire*, including pain ratings from 0 to 10, associated disability and average days unable to perform usual activities due to pain in the prior six months. It has been validated in the United States (Von Korff et al., 1992) and in the UK (Smith et al., 1997) and has been widely used in clinical research (Blyth et al., 2005; Raftery et al., 2011; Hauser et al., 2014). As no validated French version of this tool was available, the original version was translated, back-translated and pre-tested in a collaborative and iterative process according to WHO guidelines (WHO, 2015) and the Principles of Good Practise for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures (Wild et al., 2005). To improve patients' understanding, a visual analogue scale was added to the original numeric rating scale (NRS). The C*hronic Pain Grade* questionnaire contains seven questions to grade the patients' pain intensity and disability from grade I (no pain, no disability) to grade IV (high disability, severely limiting) (Smith et al., 1997). Grading was calculated according to the method described by Von Korff (Von Korff et al., 1992). Pain intensity was classified in three groups according to the NRS rating: mild (1–3), moderate (4–6) and severe (7–10) (Bouhassira et al., 2008; Attal et al., 2011).

2.6 Treatments used and LOR to practise active self-care

Patients were asked whether they used nonopioid painkillers, opioids or dietary supplements 'against pain' during the last six months and if they had already used one of the following treatments against pain: interventional blocks, physical therapy, surgery, psychiatrist/psychologist follow-up, osteopathy, acupuncture, hypnosis, therapeutic massage or different self-care methods, as described below. The LOR to practise active self-care was assessed using a 0 to 10 scale also known as the 'Readiness Ruler', created and validated initially by Rollnick (Rollnick et al., 1992). A visual analogic readiness ruler combined with a 0–10 NRS with checkboxes and an anchor statement at the two extremities was designed as described by Miller and Rollnick (Miller, 2002) (see the questionnaire in the Appendix S2). The patients were asked to answer this following question for each specific therapy investigated: 'If your doctor would give you the option, what would be your level of readiness to practise this method as a complement of your pain treatment strategy? Please use the scale from 0 to 10, 0 indicating "not at all ready" and 10 indicating "totally ready" to

practise it'. Active self-care methods were classified in five categories: physical activity adapted to the pain condition and four other categories, defined according to (Delgado et al., 2014): physically oriented therapies (e.g. acupressure, self-administered therapeutic medical massage), movement therapies (e.g. yoga, tai chi, qi gong), mind–body therapies (e.g. self-hypnosis, autogenic training, meditation/mindfulness, relaxation training, breathing exercises, imagery-guided therapy), and sensory art therapies (e.g. art therapy, dance therapy, music therapy). Categories of self-care were described in the questionnaire, as well as in the glossary added to the questionnaire on a coloured sheet, describing as precisely as possible the different therapies investigated in the questionnaire. This part was carefully tested during cognitive testing, especially with patients having never used any of these therapies. The LOR to practise active self-care as a complement of the pain treatment strategy was classified as low LOR (0–4 on the 0–10 NRS), moderate LOR (5–7) and high LOR (8–10) (Bertholet et al., 2012; Korcha et al., 2012). The perceived importance of and confidence in practicing each type of active self-care were also assessed, as these two other dimensions have been recognized to contribute to motivation building and have already been assessed in other studies about physical activity and lifestyle changes (Jensen et al., 2003; Rau et al., 2007; Bulc et al., 2015). Some other questionnaires have been developed to assess the motivation or the readiness to change, or to be involved in a treatment for chronic pain. For example, the Pain Stages of Change Questionnaire (PSOCQ) (Kerns et al., 1997), and the four versions of the Multidimensional Pain Readiness to Change Questionnaire (MPRCQ, MPRCQ2, MPRCQ2-13/26) (Nielson et al., 2008, 2009). Because of the length of these questionnaires which could affect patient's willingness to participate to studies (Nielson et al., 2009) and because they were not suitable for investigating the different types of active self-care chosen in this study, we did not include them.

2.7 Hospital Anxiety and Depression Scale

The presence of anxiety or depression mood disorder was assessed with the *Hospital Anxiety and Depression Scale (HADS*) (Zigmond and Snaith, 1983; Bjelland et al., 2002). The score has been validated in French (Bocerean and Dupret, 2014) and is well recognized (Snaith, 2003). A cut-off value of 8, with optimal specificity and sensitivity, was chosen to represent possible anxiety and depression (Zigmond and Snaith, 1983; Bjelland et al., 2002), and a score of 11 or higher indicated the probable presence of a mood disorder (Snaith, 2003). If there were two or more missing data points for each subscale, the scores were considered invalid, as suggested by Turk (Turk et al., 2015). Agreement to use the French version of the HADS questionnaire was obtained from Mapi Research Trust (France).

2.8 Statistical methods

As it was a descriptive and exploratory study, the sample size was calculated to ensure good precision for the estimation of the mean of the main outcome: the LOR to practise active self-care measured on a 0–10 scale. To obtain an estimate of an expected mean LOR of 6 (±6 standard deviation (SD)) with a margin of error of $d = 0.5$ (with d corresponding to half of the confidence interval width when estimating the mean (μ) with 95% confidence), the required sample size was calculated as $n = 4*(sd^2)/d^2 = 4*(36)/0.25 = 576$; therefore, a total of 576 responders was necessary. Given an expected response rate of approximately 50% (Raftery et al., 2011; Bjornsdottir et al., 2014) and an estimation that 30% of our sample would no longer be suffering pain, the questionnaire was sent to 1640 participants to reach the target sample size.

Data quality and completeness (unusual values, consistency and missing values) were checked. Categorical data were summarized by frequencies and percentages, and continuous variables by their mean (±SD) or median (interquartile range (IQR)) when the normality assumption was violated. The LOR to practise active self-care for the different methods was coded in three categories: low [0–3], moderate [4–7] and high [8–10]. The associations between the explanatory factors (characteristics of pain, sociodemographic data, mood disorder symptoms) and the LOR were assessed using univariable multinomial logistic regression models. The strength of the association was measured by the relative risk ratio (RRR). Factors associated with the outcome at a level of 20% ($p < 0.20$) were considered in a backward procedure to fit a multivariable model. We decided not to include the variables about previous experience with active self-care therapy, as we wanted to delineate other factors associated with the LOR. In addition, pairwise Pearson correlation coefficients between social activities, daily activities and working disability levels were calculated; Wilcoxon's

matched-pairs signed-rank tests were performed to test the differences between these scores. The same analyses were performed to assess the correlations between the LOR to practise active self-care and the perceived importance of and confidence in practicing active self-care. We used statistical tests to support our exploratory analyses, not to confirm hypotheses developed a priori. Statistical analysis was performed using Stata 14 software (StataCorp 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

2.9 Missing data

Rates of missing data for variables used in the analyses are reported for all variables. Three items had a percentage of missing data higher than 5%: body mass index (BMI), physical level of work and localization of chronic pain. For quality purposes, these variables were not used in the analysis as explanatory data.

3. Results

3.1 Study samples

Among the 1524 patients who received the questionnaire, 877 (57.5%) returned it, and 639 (41.9%) were finally included in the study. Details are shown in Fig. 1.

3.2 Sociodemographic data and working conditions

Sociodemographic data are reported on Table 1. The mean age of respondents was 59.3 years old (SD = 15.3). Two-thirds (n = 440, 68.9%) of the respondents did not work because they were retired (n = 238/440, 52.7%) or could not due to a medical condition (n = 177/440, 39.2%).

3.3 Pain characteristics

The characteristics of pain are described in Table 2. The median (IQR) duration of pain was 8.5 (9.6) years. Most respondents suffered from constant pain (n = 400, 62.6%) or at least once a day (n = 183, 28.6%). Average ± SD ratings on the 11-points rating [0–10] scale for current, average, and worst pain were 5.6 ± 2.3, 6.1 ± 2.0 and 8.2 ± 1.7, respectively. The most frequent locations of pain were the middle or low back (n = 456, 71.4%) and a lower limb (n = 437, 68.4%), followed by pain in the cervical spine (n = 165, 25.8%), an upper limb (n = 161, 25.2%), or a shoulder (n = 147, 23.0%). Neuropathic characteristics of pain were present in 327 patients (51.2%).

Almost two-thirds (n = 407, 63.7%) of the respondents had high disability grades (Chronic Pain Grade: grade III and IV). Patients reported interferences in social activities (mean = 6.0, SD = 2.8), in daily activities (mean = 5.9, SD = 2.7) and in working ability (mean = 5.8, SD = 3.1). There was a correlation between disability during social vs daily activities ($corr_{Pearson}$ = 0.672, $p < 0.01$), during working vs daily activities ($corr_{Pearson}$ = 0.714, $p < 0.01$) and during working vs social/recreational activities ($corr_{Pearson}$ = 0.778, $p < 0.01$).

3.4 Hospital Anxiety and Depression Scale

Among the respondents, 37.2% (n = 238) had a probable mood disorder, and 25.5% (n = 163) had a possible mood disorder. About a quarter had a probable depressive mood disorder (n = 166, 26.0%), and 28.3% (n = 181) had a probable anxious mood disorder.

3.5 Use of healthcare resources

During the last six months, 93.4% (n = 597) of respondents had used painkillers, and 64.6% (n = 413) had used opioids. The use of dietary supplements 'against pain' was reported by 31.7% (n = 203) of respondents. The most common were magnesium, calcium and vitamins, followed by herbal medicine (e.g. *Harpagophytum procumbens*). The majority of patients (n = 527, 82.5%) had received an interventional block at least once, as well as physical therapy (n = 499, 78.1%). Among other methods, 48.4% (n = 309) used therapeutic massage, 31.8% (n = 203) osteopathy, 26.1% (n = 167) acupuncture, and 8.9% (n = 57) hypnosis; 33.5% (n = 214) had consulted a psychiatrist or psychologist. The frequency of patients having already used active self-care was 57.0% (n = 364) for physical activity adapted for the pain condition, 29.1% (n = 186) for physically oriented therapies, 25.4% (n = 162) for mind–body therapies, 12.7% (n = 81) for movement therapies and 10.3% (n = 66) for sensory art therapies.

3.6 LOR to practise active self-care methods when suggested by a physician

A high or moderate LOR to practise active self-care was found in 44.1% (n = 282) and in 24.6%

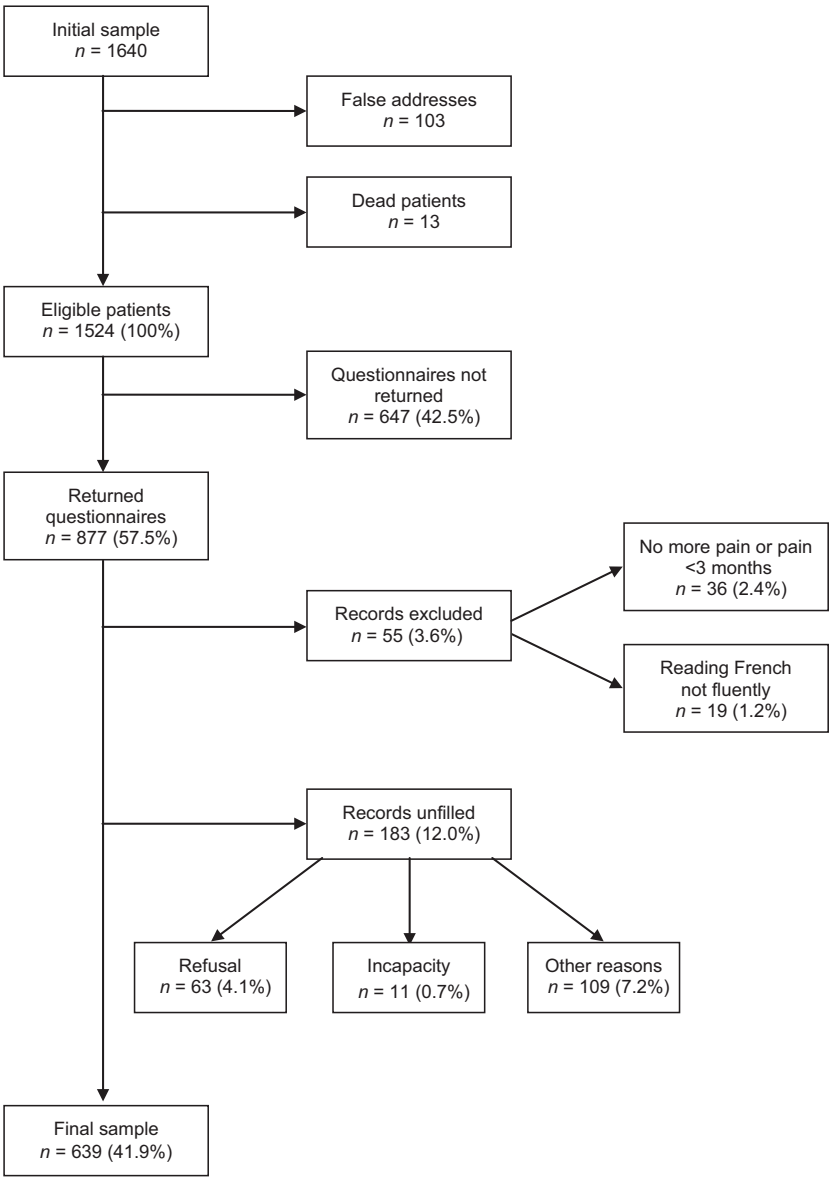

Figure 1 Flow diagram of the study.

(n = 157) of patients, respectively. The LOR was slightly higher for physical activity adapted for pain condition and physically oriented therapies (e.g. acupressure). The results are reported in Fig. 2.

The comparison of a low, moderate and high LOR to practise active self-care using univariate multinomial logistic regression analysis is described in Table 3. A high LOR to practise active self-care was associated with higher education levels, the presence of neuropathic characteristics, higher worst pain scores, higher disability in social and recreational activities and the use of dietary supplements. Older age, living alone and being unemployed were associated with a lower LOR to practise active self-care. Patients who had already used a self-care method had a higher LOR to practise active self-care, the highest association being for mind–body therapies, followed by sensory art therapies. The duration of pain, expressed in years, was not clinically different among the low (median = 5.0, IQR: 7.5), moderate (median = 4.5, IQR: 7.8) and high LOR groups (median = 5.0, IQR: 9.0). Other pain characteristics (frequency, localization), chronic pain grade, the presence of anxiety or depression and the use of opoids did not influence the LOR to practise active self-care.

Table 1 Sociodemographic data of the sample (n = 639).

Variables	Groups	n (%)
Age (years)	<25	8 (1.3)
	25–34	28 (4.4)
	35–49	128 (20.0)
	50–64	217 (34.0)
	65–75	144 (22.6)
	>75	103 (16.1)
	Missing	11 (1.7)
Gender	Female	355 (55.6)
	Male	270 (42.3)
	Missing	14 (2.2)
Country of birth	Switzerland	390 (61.0)
	Other	240 (37.6)
	Missing	9 (1.4)
BMI	Underweight (<18.5)	18 (2.8)
	Normal (18.5–24.9)	234 (36.6)
	Overweight (25–29.9)	177 (27.7)
	Obese (≥30)	140 (21.9)
	Missing	70 (11.0)
Living status	Alone	162 (25.4)
	Single with kids	36 (5.6)
	Couple without kids	238 (37.3)
	Couple with kids	149 (23.3)
	With somebody	43 (6.7)
	Missing	11 (1.7)
Education	Basic	189 (29.6)
	Apprenticeship	211 (33.0)
	University/upper specialized school	223 (34.9)
	Missing	16 (2.5)

The results are expressed as the number of participants (percentage), n (%). BMI: body mass index (kg/m^2) was calculated using self-reported weight and height.

Table 2 Characteristics of pain (n = 639).

Variables	Groups	n (%)
Duration (years)	<1	24 (3.8)
	1–<3	150 (23.5)
	3–<5	134 (21.0)
	5–10	132 (20.7)
	>10	194 (30.4)
	Missing	5 (0.8)
Chronic pain grade	Grade I	59 (9.2)
	Grade II	160 (25.0)
	Grade III	162 (25.4)
	Grade IV	245 (38.3)
	Missing	13 (2.0)
Current pain intensity	Mild (1–3)	133 (20.8)
	Moderate (4–6)	257 (40.2)
	Severe (7–10)	247 (38.7)
	Missing	2 (0.3)
Average pain intensity	Mild (1–3)	58 (9.1)
	Moderate (4–6)	302 (47.3)
	Severe (7–10)	271 (42.4)
	Missing	8 (1.3)
Worst pain intensity	Mild (1–3)	8 (1.3)
	Moderate (4–6)	76 (11.9)
	Severe (7–10)	550 (86.1)
	Missing	5 (0.8)

The results are expressed as the number of participants and percentage: n (%).

The comparison of a low, moderate and high LOR to practise active self-care using multivariate multinomial regression analysis is described in Table 4. Apprenticeship and university or upper specialized school education level (RRR = 3.42, 95% CI: 1.90–6.13, $p < 0.001$), unemployment due to health-related conditions (RRR = 2.92, 95% CI: 1.30–6.56, $p = 0.009$), neuropathic pain characteristics (RRR = 1.80, 95% CI: 1.04–3.12, $p = 0.036$) and the use of dietary supplements (RRR = 2.77, 95% CI: 1.52–5.04, $p = 0.001$) were factors that were independently associated with a high LOR. Older age was an independent negative factor associated with a high LOR (RRR = 0.97, 95% CI: 0.94–0.99, $p = 0.039$).

3.7 Correlation between the readiness to practise self-care and the perceived importance of and confidence in practicing active self-care

The strongest correlation among the three possible ways to evaluate the motivation of a patient to practise active self-care was found between readiness and perceived importance ($corr_{Pearson} = 0.805$, $p < 0.001$), followed by the correlations between perceived importance and confidence ($corr_{Pearson} = 0.785$, $p < 0.001$) and between readiness and confidence ($corr_{Pearson} = 0.727$, $p < 0.001$).

4. Discussion

In an academic medical centre, the majority of chronic pain patients were ready to try active self-care, as a half of them had a high LOR to practise active self-care, and a quarter had a moderate LOR. Physical activity adapted to the pain condition exhibited the highest LOR, followed by physically oriented therapies, movement and mind–body therapies, and lastly sensory art therapies. Higher levels of education, unemployment due to health-related issues, the use of dietary supplements 'against pain' and neuropathic pain were associated with a higher LOR, while older age predicted a lower LOR. The LOR was not associated with the pain duration, high disability associated with pain or the presence of a mood disorder.

The chronic pain population of this study was comparable to those in the literature in terms of sex (higher female ratio) (Breivik et al., 2006;

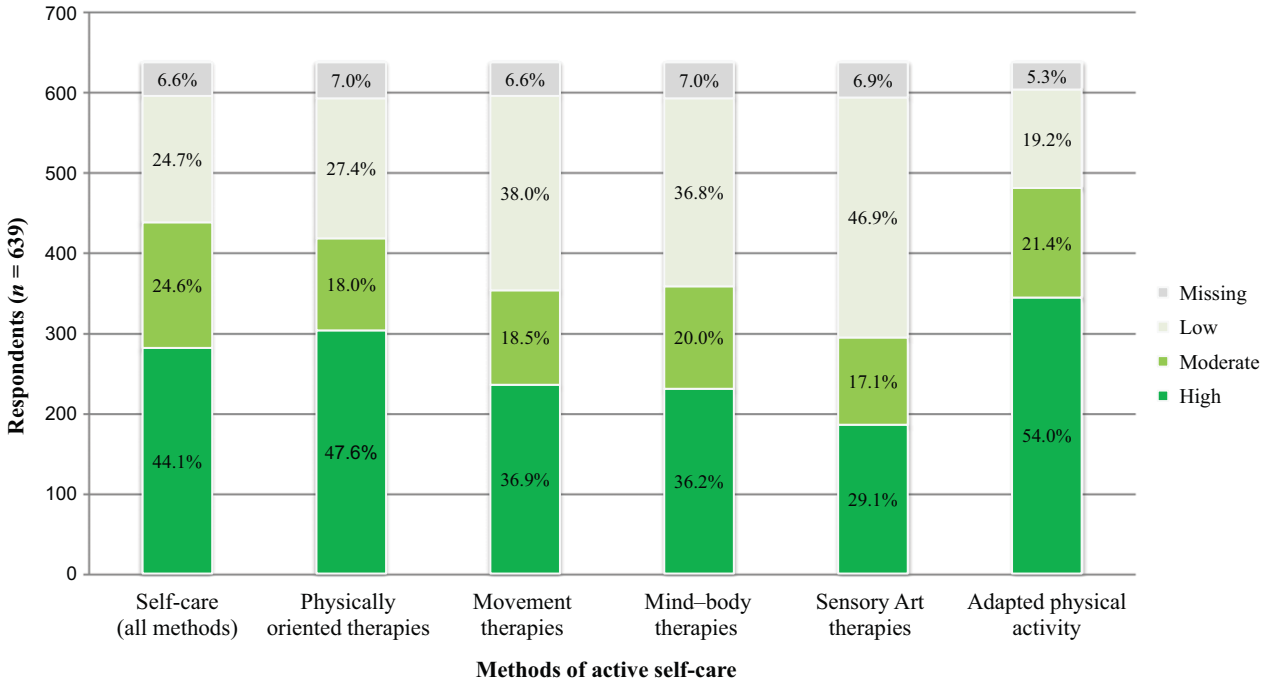

Figure 2 The level of readiness of chronic pain patients to practise self-care methods. Groups defined according to the numeric rating scale from 0 to 10: low (0–3), moderate (4–7) and high (8–10). Physically oriented therapies (acupressure, self-administered therapeutic massage); movement therapies (yoga, tai chi, qi gong); mind–body therapies (self-hypnosis, meditation/mindfulness, relaxation training, imagery-guided therapy); sensory art therapies (art therapy, dance therapy, music therapy); adapted physical activity.

Bouhassira et al., 2008; Hardt et al., 2008; Gosden et al., 2014), BMI (most frequently normal or overweight) (Vaegter et al., 2014), mean age (Gosden et al., 2014; Campbell et al., 2015) and inactivity because of health issues. The most frequent locations of pain were the back and a lower limb, similar to the results of other studies in Europe and the United States (Breivik et al., 2006; Hardt et al., 2008; Kurita et al., 2012). As the aetiology of chronic pain was only self-reported by the patients, we decided not to analyse this data because there was a risk of an understanding bias. Only location and neuropathic pain characteristics (using the DN4-7 item) were taken into account.

The median pain duration was comparable to that of other chronic pain studies, mostly ranging from 3 to 10 years (Hauser et al., 2014; Vaegter et al., 2014). The 50% prevalence of neuropathic pain characteristics was higher than the 20% previously described in Denmark (Vaegter et al., 2014) and in France (Bouhassira et al., 2008). This difference could be linked with the higher referral rate of neuropathic pain patients to a tertiary (university) Pain Center. More than 60% of patients had a high disability associated with chronic pain, which was twice as high as previously reported values (Hauser et al., 2014). Again, this might be explained by a selection bias of critical chronic pain patients referred to the Pain Center.

Two-thirds of the patients had used opioids, confirming the high prevalence of opioid use previously described in other countries among chronic pain patients (Kurita et al., 2012) (Weisner et al., 2009) (Edlund et al., 2014) (Dowell et al., 2016). The risks of major side effects, such as addiction, abuse or overdose (Edlund et al., 2014; Sutherland, 2014), as well as the increased risk of all-cause mortality (Ekholm et al., 2014), highlight the need to redirect treatment strategies to other pharmacological or nonpharmacological therapies (Mallen and Hay, 2015; Volkow and McLellan, 2016), while taking into account the patient as a whole, according to the biopsychosocial model of chronic pain.

The LOR to practise active self-care methods if suggested by a physician was high in our population of chronic pain patients. As this was the first study on the LOR to practise different types of active self-care among chronic pain patients, a comparison with other studies was not possible. However, it was surprising to find that more than half of this population, considered to be poorly active and severely affected by pain, were prone to consider active self-

Table 3 Comparison of low, moderate and high levels of readiness to practise self-care therapies among chronic pain patients using univariate logistic regression analysis.

	Low LOR *N* (%) or mean (SD)	Moderate LOR *N* (%) or mean (SD); RRR [95% CI], *p*	High LOR *N* (%) or mean (SD); RRR [95% CI], *p*
Sociodemographic			
Age (mean, SD)	64.3 (15.5)	**59.07 (15.3) 0.98[0.96–0.99], 0.002**	**56.5 (14.3) 0.96[0.95–0.98], <0.001**
Sex male (ref=female)	59 (38.3)	72 (47.1) 1.43 [0.91–2.25], 0.122	120 (43.5) 1.24 [0.83–1.85], 0.298
Country of birth (Swiss, ref=other)	104 (67.1)	98 (63.6) 0.86 [0.54–1.37], 0.523	170 (60.9) 0.77 [0.51–1.16], 0.203
BMI (mean, SD)	26.9 (4.7)	26.57 (6.1) 0.99 [0.94–1.03], 0.604	26.4 (4.8) 0.98 [0.94–1.02], 0.362
Living alone (ref=not living alone)	47 (30.1)	46 (29.9) 0.99 [0.61–1.61], 0.960	**58 (20.9) 0.61 [0.39–0.96], 0.033**
Education			
Basic	61 (39.9); 1 (ref)	45 (29.2) 1 (ref)	66 (23.8) 1 (ref)
Apprenticeship	50 (32.7)	54 (35.1) 1.46 [0.85–2.52], 0.170	**94 (33.9) 1.74 [1.07–2.83], 0.027**
University/upper specialized school	42 (27.5)	**55 (35.7) 1.78 [1.02–3.10], 0.043**	**117 (42.2) 2.58 [1.57–4.23], <0.001**
Employment			
Unemployed (ref=with work)	126 (80.2)	**107 (68.6) 0.54 [0.32–0.90], 0.019**	**176 (63.1) 0.420 [0.27–0.67], <0.001**
Unemployed due to health condition	32 (24.8)	39 (35.1) 1.64 [0.94–2.87], 0.082	**99 (54.4) 3.616 [2.21–5.93], <0.001**
Pain's duration, years (median, IQR)	7.9 (7.5)	8.2 (7.8) 1.00 [0.98–1.03], 0.774	9.2 (9.0) 1.01 [0.99–1.04], 0.203
Pain's frequency			
Constant pain	97 (61.8); 1 (ref)	92 (58.6) 1 (ref)	184 (65.3) 1 (ref)
Pain at least once a day	50 (31.9)	47 (29.9) 0.99 [0.61–1.62], 0.971	76 (27.0) 0.80 [0.519–1.24], 0.316
Pain less frequent than daily	10 (6.4)	18 (11.5) 1.90 [0.83–4.33], 0.127	22 (7.8) 1.16 [0.53–2.55], 0.712
Pain with neuropathic characteristics(ref=negative)	62 (40.8)	**80 (54.1) 1.71 [1.08–2.70], 0.022**	**171 (60.9) 2.26 [1.51–3.38], <0.001**
Drug or dietary supplement use			
Use of painkillers (ref=no use)	153 (96.8)	**142 (91.0) 0.33 [0.12–0.94], 0.039**	267 (95.0) 0.62 [0.22–1.76], 0.373
Use of opioids (ref=no use)	102 (69.9)	95 (66.4) 0.85 [0.52–1.40], 0.532	190 (70.6) 1.04 [0.67–1.61], 0.870
Use of dietary supplements (ref=no use)	37 (23.7)	43 (28.3) 1.27 [0.76–2.11], 0.361	**116 (41.4) 2.28 [1.47–3.53], <0.001**
Pain scores			
Average pain score(mean, SD)	6.2 (2.1)	6.2 (1.7) 1.01 [0.90–1.13], 0.934	6.1 (2.0) 0.97 [0.88–1.07], 0.542
Worst pain score (mean, SD)	8.0 (1.8)	8.2 (1.5) 1.09 [0.95–1.24], 0.212	**8.4 (1.6) 1.19 [1.06–1.34], 0.004**
Current pain score (mean, SD)	5.6 (2.3)	5.8 (2.0) 1.04 [0.94–1.15], 0.415	5.4 (2.4) 0.96 [0.88–1.05], 0.356
Disability			
Disability in daily activities(mean, SD)	5.7 (2.8)	5.9 (2.6) 1.03 [0.95–1.12], 0.461	6.2 (2.6) 1.07 [0.99–1.15], 0.070
Disability in social or recreational activities (mean, SD)	5.6 (2.9)	5.9 (2.5) 1.04 [0.97–1.13], 0.292	**6.3 (2.9) 1.10 [1.02–1.18], 0.009**
Disability in work (mean, SD)	5.1 (3.1)	5.7 (3.0) 1.05 [0.98–1.13], 0.154	**6.2 (3.1) 1.11 [1.04–1.18], 0.001**
Chronic pain grade			
CPG I	15 (9.6)	9 (5.8)	29 (10.3)
CPG II	46 (29.3)	47 (30.1) 1.70 [0.68–4.28], 0.257	63 (22.4) 0.71 [0.34–1.47], 0.355
CPG III	42 (26.8)	46 (29.5) 1.83 [0.72–4.61], 0.203	64 (22.8) 0.79 [0.38–1.64], 0.526
CPG IV	54 (34.4)	54 (34.6) 1.67 [0.67–4.13], 0.270	125 (44.5) 1.20 [0.59–2.41], 0.614
Anxiety or depression disorder			
Probable anxiety disorder (ref=absent/doubtful)	42 (27.5)	45 (29.0) 1.08 [0.66–1.78], 0.758	85 (30.4) 1.15 [0.74–1.78], 0.526
Probable depression disorder (ref=absent/doubtful)	38 (24.5)	45 (29.0) 1.26 [0.76–2.09], 0.370	75 (26.8) 1.13 [0.72–1.77], 0.605
Already used active self-care therapies (ref=not used)			
Physically oriented therapies	21 (14.4)	**34 (23.8) 1.86 [1.02–3.39], 0.044**	**123 (45.9) 5.05 [3.00–8.50], <0.001**
Movements therapies	8 (5.5)	**21 (14.5) 2.92 [1.25–6.83], 0.013**	**49 (18.6) 3.93 [1.81–8.55], 0.001**
Mind–body therapies	14 (9.7)	**36 (24.8) 3.09 [1.59–6.03], 0.001**	**104 (39.1) 6.01 [3.29–10.99], <0.001**
Sensory art therapies	5 (3.5)	13 (9.2) 2.82 [0.98–8.14], 0.055	**46 (17.3) 5.86 [2.27–15.09], <0.001**
Adapted physical activity	66 (44.6)	**85 (56.3) 1.60 [1.01–2.53], 0.044**	**197 (73.0) 3.35 [2.20–5.11], <0.001**

LOR, level of readiness. The results are expressed as the mean and standard deviation (SD) or frequency (*N*) and per cent (%), relative risk ratio (RRR) [95% CI], *p* value (*p*). Significant data with a *p* value less than 0.05 appear bold. Associations between the explanatory factors and the LOR were assessed using a univariable multinomial logistic regression model.

Table 4 Comparison of low, moderate and high levels of readiness to practise self-care therapies among chronic pain patients using a multivariate multinomial logistic regression analysis.

Factors	Low LOR	Moderate LOR RRR [95% CI], *p*	High LOR RRR [95% CI], *p*
Age	1 (ref)	**0.97** [0.94–0.99], **0.020**	**0.97** [0.94–0.99], **0.039**
Apprenticeship, university or upper specialized school (ref: basic)	1 (ref)	**2.48** [1.32–4.63], **0.004**	**3.42** [1.90–6.13], **<0.001**
Unemployed due to health condition (ref: employed)	1 (ref)	1.12 [0.47–2.67],0.800	**2.92** [1.30–6.56], **0.009**
Pain with neuropathic characteristics (ref: negative)	1 (ref)	**2.02** [1.11–3.67], **0.020**	**1.80** [1.04–3.12], **0.036**
Use of dietary supplements (ref: no use)	1 (ref)	1.55 [0.80–3.03],0.197	**2.77** [1.52–5.04], **0.001**

LOR, level of readiness. The results are expressed as the relative risk ratio (RRR) [95% CI], *p* value (*p*). Factors associated with the outcome at a level of 20% ($p < 0.20$) in the univariable multinomial logistic regression were considered in a backward procedure to fit a multivariable model. Significant data with $p < 0.05$ appear bold.

care. Moreover, the LOR was not associated with pain duration or with related disability or mood disorder, meaning that even patients with pain lasting for a very long period or with high disability were interested in active self-care.

A higher level of education has already been described as a factor increasing the use of therapies outside the field of conventional medicine, such as active self-care methods (Blyth et al., 2005) or complementary therapies (Eisenberg et al., 1998). The association between a low education level and a low LOR could be explained by a lack of knowledge of pain itself and available treatment strategies. Healthcare practitioners should help their patients to determine all potentially effective treatment options.

Patients exhibiting pain with neuropathic characteristics showed a higher LOR. As chronic pain patients with neuropathic characteristics showed a higher degree of related disability, such as lower quality of life, more sleep disturbance, anxiety and depression (Bouhassira et al., 2013), this might act as a 'trigger' to try every possible option to improve pain. While the use of painkillers did not influence the LOR in our study, the use of dietary supplements 'against pain' predicted a higher LOR.

As it was the first study about the LOR to practise different types of active self-care, we correlated the LOR with the perceived importance of and confidence in practicing self-care, as these two other indicators were already investigated in studies about motivation in health (Bertholet et al., 2012). There was a good correlation among these three parameters, meaning that the variable LOR could be a good tool for assessing patients' motivation. Considering the LOR of the patients to use one method of self-care (or another treatment option) is crucial. Adapting the treatment strategy according to the patient's preference would probably improve the effectiveness of self-care; for example, this adaptation of treatment to the patient's preference has been shown to maximize the efficacy of integrative therapy in breast cancer (Carlson et al., 2014).

While studies on the effect of various self-care therapies for chronic pain are increasing, such as exercise (Chou et al., 2017), tai chi (Chou et al., 2017), yoga (Chou et al., 2017) and mindfulness-based stress reduction (Cherkin et al., 2016; Chou et al., 2017), the strength of the evidence of effectiveness remains low or moderate (Chou et al., 2007; Rosenquist Richard, 2010; Wong et al., 2017). Even if a recent meta-analytic review 'found small but robust effects of guided self-help interventions for the treatment of chronic pain' (Liegl et al., 2016), more studies about the effectiveness of different types of active self-care are needed, notably to compare the different types of self-care therapies. Self-care methods that showed a higher LOR in this study should be studied first, as they would most likely be accepted by the majority of chronic pain patients.

5. Limitations

There are several limitations to this study. First, the investigation of the LOR as a reflection of the motivation to practise active self-care has not been performed by others. Although we used standardized questions used in other domains of motivation for change, we do not know whether the observed data on LOR demonstrate real readiness to do so even though there was a good correlation between LOR, importance and confidence. More studies are needed to confirm that LOR is correlated to motivation of the patient and may predict actual involvement in active self-care. Second, LOR is not a trait of the individual, as it is influenced by multiple aspects, especially beliefs concerning the pain itself and the treatment (degree of feasibility, perceived importance, confidence (or self-efficacy) and expectations) (Marcus et al., 1992; Keller et al., 2001;

Jensen et al., 2003; Rau et al., 2007). Our study reflects endogenous motivation of the patients involved in the study at the time they were filling in the questionnaire, before any of these therapies have been really implemented by their physician in their pain treatment strategy. The level of readiness could surely evolve or be influenced by factors like the patient–provider interaction (Frantsve and Kerns, 2007) that were not investigated in this study. Third, the study was conducted in a single academic Pain Center, and the results could differ from those in other tertiary hospitals. The population of our study was also comparable to those of other studies on chronic patients regarding age, sex and BMI. Fourth, the study itself could have introduced a bias of answering by suggesting to patients that self-care options are valuable if investigated by a Pain Center. Meanwhile, no self-care therapy was offered at the time of the study, neither in the Pain Center nor in other areas of our hospital. Fifth, the definition of each therapy was based on the personal knowledge of each patient and on a lexicon integrated in the questionnaire. The results could have been influenced by a lack of exact knowledge of each therapy. Sixth, the response rate in our study (41.9%) was in the low range of other postal surveys on pain among the general population (ranging from 40.1% to 60.7%) (Hauser et al., 2014; Jakobsson and Larsson, 2014; Kurita et al., 2012; Landmark et al., 2013; Raftery et al., 2011; W. S. Wong and Fielding, 2011) but higher than another postal survey including patients from a Pain Center (21%) (Gosden et al., 2014). This could have introduced a selection bias. Additionally, as patients had to fill the questionnaire in themselves, patients with a lower level of education, especially those with difficulty in reading French fluently, could be underrepresented in this study. Finally, the influence of catastrophizing, another aspect that has been shown to be correlated with poorer response to multidisciplinary pain treatments (Spinhoven et al., 2004), on patients' readiness for self-care, was not evaluated.

6. Conclusion

Most chronic pain patients had a high or moderate LOR to practise active self-care methods if suggested by their physicians. Although the actual meaning and predictive ability of the LOR need to be assessed further, we found plausible results, such as an association of the LOR with a high level of education and neuropathic pain characteristics. The LOR was not lower for patients suffering from long-term chronic pain, high disability or mood disorders, suggesting that severely affected patients were also motivated to try active self-care. At a time of intense discussions about the benefits and risks of opioids, patients seem to be ready to try other treatment modalities. Active self-care therapies seem to be treatment options meriting further study for their impact on pain, mood disorders and quality of life, especially because patients do not seem reluctant to try them.

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Ethics approval and consent to participate

The protocol and the questionnaire were approved by the ethics committee of the Canton of Vaud. Informed consent was sought and granted.

Availability of data and materials

The data sets generated during this study are available from the corresponding author upon reasonable request.

Author contributions

E.S., I.D. and P.Y.R. conceived the study. E.S., I.D., B.B. and P.Y.R. developed the study design. E.S., I.D. and P.Y.R. oversaw the trial. E.S., B.B. and P.Y.R. drafted the manuscript. E.S., P.Y.R. and M.F. analysed the data. All authors have read and approved the final manuscript.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1 Enquête auprès des patients sur leur douleur chronique et leur motivation à pratiquer de l'autosoin comme complément au traitement.

Appendix S2 Lexique des méthodes de traitement apparaissant dans le questionnaire.